
Space Weather Forecast

Issued on Friday 11 October 2024 at 02:24 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales <https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales>

Space Weather Forecast Headline: Initial G4-G5/Severe-Extreme Geomagnetic storms (Kp 8-9) easing though day 1 (11 Oct) to G1-G2/Minor-Moderate (Kp 5-6) by the end of the 11 Oct. Ongoing S1/Minor radiation storm, easing later 11 Oct. Likely R1-R2, now reducing risk of further Major (R3) radio blackouts.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Activity has returned to Moderate levels, with an M3.0 from AR3842 peaking at 10/2230UTC. There are six numbered sunspot regions on the visible disc. The largest region on the disk is AR3848 in the northwest, losing its delta magnetic complexity in recent hours. The next notable spot is the rapidly-growing AR3854 in the southeast, with a spreading tendency continuing. AR3852, just ahead of AR3854, has shown a gradual spreading trend, with north-south magnetic shear. AR3849, in the southwest near centre disc, showed little change, while AR3850, to its immediate west is trending toward becoming a unipolar region. Previously active AR3842 has now completely rotated beyond the southwest limb.

No further Earth-directed CMEs have been observed.

Solar Wind / Geomagnetic Activity: The period was dominated by the arrival of the large CME from the strong flare and filament eruption on 09 Oct. The solar wind showed a rapid incline from slightly elevated to very strong around 10/1445 UTC. With a further enhancement back to very strong around 10/2200 UTC. The IMF B_t, became strong or very strong with an initial peak at 10/1630 UTC, before a secondary peak of very strong at 10/2200 UTC. The north-south component followed a similar trajectory with the almost entire period in negative (southward) directed orientation, with peaks of negatively very strong observed especially after 10/2215 UTC. The net result of the above solar wind measures was for Quiet to Active (Kp 2-4) geomagnetic activity followed by two G4/Severe (Kp8) periods and a G5/Extreme (Kp9) period to end the UTC day.

Energetic Particles / Solar Radiation: Solar radiation levels continued their response to the Strong-class flare from 09 October. 10MeV peaked at 1810pfu (S3, major solar radiation storm) at 10/1515UTC and have since shown a very gradual downward trend. 100MeV commenced their downward tendency prior to this reporting period, and peaked at 0.13pfu at the start of the 24-hour window.

Four-Day Space Weather Forecast Summary

Solar Activity: The chances of further Strong-class flares and Major radio blackouts (R3) reduce in the period as the most active sunspot region leaves the facing side. Minor radio blackouts (R1) remain likely given sunspot developments on the Sun; their complexity; and up to four arrivals over the eastern solar horizon to round out the current UTC working week.

Solar Wind / Geomagnetic Activity:

The CME from the X1.8 flare and filament eruption is continuing to affect Earth, with an ongoing significant geomagnetic response. Solar wind speeds remain Strong and are expected to continue through the first part of 11 Oct, with a gradual easing trend later in the UTC day. Solar wind speeds should return to slightly elevated levels later day 2 or into day 3. There is also a potential coronal hole fast wind late day 3 (13 Oct), with any fast wind approaching 450km/s.

Initial G4-G5/Severe-Extreme Geomagnetic storms (Kp8-9) should begin to ease though day 1 (11 Oct) as the CME effects wane, becoming G1-G2/Minor-Moderate (Kp 5-6) by the end of the day. G1-G2/Minor-Moderate (Kp 5-6) are then likely early day 2 (12 Oct) with a slight chance of residual G3/Strong storms. Quiet-Active (Kp 1-4) activity is then expected days 3 and 4 (13-14) with a Slight Chance of G1 should either of the coronal holes' fast winds impinge on Earth.

Energetic Particles / Solar Radiation: The risk of S1/Minor radiation storms remains for the first half of today (11 Oct) but falls thereafter, becoming near background levels with a slight chance of S1 from day 3 (13 Oct).

Geomagnetic Storms

Geomagnetic Storm	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Minor or Moderate	G1 to G2	Yes	100	60	10	5
Strong	G3	Yes	95	20	1	1
Severe	G4	Yes	80	5	1	1
Extreme	G5	Yes	60	1	1	1

Radio Blackouts - X-Ray Flares

X-Ray Flares	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability			(%)	(%)	(%)	(%)
Active	R1-R2 (M Class)	Yes	70	60	60	60
Very Active	R3-R5 (X Class)	No	20	15	10	10

Solar Radiation Storms (High Energy Protons)

Radiation Storms	Level (cm ⁻² sr ⁻¹ s ⁻¹)	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Active	≥ S1	Yes	90	30	20	20
Very Active	≥ S3 *	Yes	10	5	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and/or 50 MeV ≥ 10pfu. (pfu = cm ⁻² sr ⁻¹ s ⁻¹)						